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Empire Troubador Model 598 Turntable System



MANUFACTURER'S SPECIFICATIONS:

Speeds: 33 $\frac{1}{3}$, 45, 78; **Motor:** Hysteresis-Synchronous, outer-rotor type; **Platter Diameter:** 12 in.; **Drive:** Belt, from stepped pulley on motor shaft; **Platter Weight:** 7 lbs.; **Arm:** Model 990, integral; mounted on three-arm "star" structure with turntable bearing at center; star is flexibly mounted to motor board; **Stylus-force method:** Balance and calibrated spring; **Max. Tracking Error:** 0.7 deg.; **Wow and Flutter:** .01%; **Rumble:** -55 dB (NAB); **Dimensions:** 16 x 13 $\frac{1}{2}$ in.; **Height above mounting surface:** 3 $\frac{1}{4}$ in.; **Depth below base plate:** 3 $\frac{1}{2}$ in.; **Finish:** Swiss ground gold. **Overall Dimensions** (with base and dust cover: 17 $\frac{1}{2}$ in wide, 15 $\frac{1}{8}$ in. deep, 8 in. high. **Price:** \$199.95. Optional walnut base and Plexiglass dust cover, \$34.95.

The new Model 598 from Empire was made necessary when the latest cartridge—the 1000 ZE—was found to be limited only by the turntable/arm combination with which it was used. The cartridge was actually capable of lighter stylus forces than could be employed with existing turntables and arms. So the en-

gineers started out to improve the turntable/arm part of the record-playing chain to take advantage of the performance possible with the new cartridge.

To begin with, the turntable itself had to be driven by a belt from a hysteresis-synchronous motor to ensure constancy of speed and a minimum of rumble which in many units is transmitted from the motor to the platter by contact through the idler. The platter had to be heavy, and even at its relatively slow rotation it had to be dynamically balanced. To avoid interaction between the platter and the magnets in the usual magnetic-cartridge, the platter had to be of non-ferrous material—aluminum. To be heavy, therefore, it had to be large, with most of the weight concentrated in the rim, which meant that the rim had to be deep. But a 3-inch thickness of platter standing above the chassis of a turntable would not look very attractive, so it was made of two parts—the heavy, deep aluminum platter, and a “dress” ring of the same aluminum proportioned attractively, which could be left visible above the chassis, while still leaving the heavy belt-driven platter as it was, only now it would be obscured unless the dress ring was removed—a necessity when changing speeds, for additional speed-changing “hardware” would only complicate construction and lead to possible increases in rumble. Then a large customized rubber mat was added to cover the platter and dress ring, resulting in a handsome visible part of the turntable.

It is, of course, necessary that the arm and the turntable be solidly attached to each other—no compliance or relative motion can be tolerated—and furthermore, the entire structure must be flexibly mounted to the chassis, which could then be firmly mounted to a base, or into any custom enclosure the user wanted. Consequently, the two were mounted on a cast tripod-like structure, with the three “legs” each suspended by a combination of a spring and a piston which effectively damp out any vibration or shock which might be transmitted from the chassis to the tripod. The shaft, integral with the turntable, is of finely polished chrome steel, and the oilite bearing honed to fit the individual shaft with which it is to work.

The arm is mounted on a “shelf” on one of the tripod legs, and electrical connections are made with a 5-pin plug and socket. Both vertical and horizontal pivots are sealed instrument-type ball bearings, and after balancing with the counterweight for the mass of the cartridge, the stylus force is set by a calibrated hair-spring, the dial being calibrated in one-gram steps, each about $\frac{1}{8}$ in. At the top of the bearing structure, a vernier adjustment sets the anti-skating compensa-



Fig. 1—Showing arm mounting and “Dyna-lift.”

tion. The counterweight axis is an extension of the stylus-to-pivot axis to eliminate any unbalance from that source. The cueing control lifts and lowers the arm gently and exactly where you want it, with no bias as the arm is lowered. The whole arm assembly can be raised or lowered over a range of $1\frac{1}{2}$ in. to permit its use with *any* turntable when it is obtained as a separate unit. On its base is a “Dyna-lift” which will raise the arm at the end of a record, or if you want to play a record with a smaller-than-standard runout groove, you may tilt the lift away.

The head of the arm is permanently attached, with a cartridge-mounting plate that is instantly removable by loosening a thumbscrew in the center of the head. This allows the cartridge and mounting plate to be removed from the arm. Contact between the plate and the arm is by gold-plated pins and springs.

The arm rest is attached to the chassis, and fitted with a light which illuminates the record surface where the stylus is to be set down. A plastic ring can be rotated to douse the light when it is not wanted. The rest is fitted with a nylon hold-down pin which is spring loaded to secure the arm gently but firmly. The white nylon pin serves also as a pilot light to indicate when the power is on—which is done by depressing a black push-push button near the front of the chassis to turn power on or off.

A die-cast cover plate protects the motor pulley and the belt, and is removable when a speed change is desired. The belt is simply moved from one step on the pulley to another, and the platter rotated by hand for a revolution or so to get the belt in alignment with the pulley step. An adjusting screw on the motor mount provides a vernier speed control.

The chassis plate, arm, dress ring, and arm rest are all in a Swiss gold finish, providing a handsome unit which could well be mounted where it could be admired. When used with the optional walnut base

and plexiglass dust cover, it is a truly handsome unit. The dust cover has walnut end pieces, and is hinged to a walnut back plate in such a manner as to stay where you put it—either raised or lowered or anywhere in between.

But enough for the description—let's get to the performance.

Performance

The 598 is just about all it is claimed to be. It does have a very low rumble, it does have a very low wow-and-flutter figure, it is almost impervious to jarring or bumping of the base so you can use it in a home where the flooring is not as sturdy as you would like. The rumble figure is probably the most important, and we measured it as -54 dB by the NAB method, which corresponds to about -74 dB by the ARL (audible rumble loudness level), and even that -54 figure is straining our measuring facilities. In short, the turntable is practically silent—sort of a Dolby-ized phonograph. Imagine what that will mean when we get more Dolby-ized records. After a brief run-in, we found wow-and-flutter to be .03 per cent in the 6- to 250-Hz range, with an increase to .06 per cent in the 0.5- to 6- and 0.5- to 250-Hz ranges, all of which are excellent. The remaining important parameter is the arm resonance, which we found to be well below 10 Hz, and from observations of the response curve—on which we found a tiny bump at 13 Hz—to be at 6.5 Hz.

In view of these performance figures, one can only conclude that the 598 is a finely crafted and well designed record playing device. And its sheer beauty should make it acceptable to any home-maker who prefers equipment that does not look like a broadcast station.

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the platter and start the unit in the automatic mode and have the arm set down at the proper place without touching the arm or the lift lever. At the conclusion of play, the arm will lift and return to its rest, and the motor will stop. In addition, the idler is retracted from contact with platter and motor shaft.

In the MANUAL position, the unit can be used to cue a specific point in a record for such applications as dubbing onto tape to create a musical background. The cueing spot is found, and with the stylus left in the groove, the platter is stopped by moving the control lever to "0". Then the platter is rotated by hand about half a revolution backward—the stylus still in the groove. To cue in the desired music, the control lever is moved to MANUAL START, and the level control on the recorder turned up to the correct position for recording. This may sound complicated, but with a little practice you can make cues as effectively as anyone can with professional equipment.

The single-play spindle attaches firmly into the mechanism with a quarter-turn clockwise. A rotating sleeve on the spindle turns with the record and avoids the possibility of wearing the center hole. The automatic spindle attaches in the same manner, and will hold a stack of ten records. By inserting the automatic spindle and *not* rotating it, the unit will play the record on the platter continuously over and over until stopped.

The motor is a dynamically balanced four-pole induction type, flexibly mounted to the chassis, which is a steel stamping with an attractive dress plate of grained aluminum. This plate is bonded to the chassis to avoid resonance. The motor pulley has three slightly tapered steps, with the speed changes resulting from the three steps, and the pitch-change feature is provided by moving the idler up and

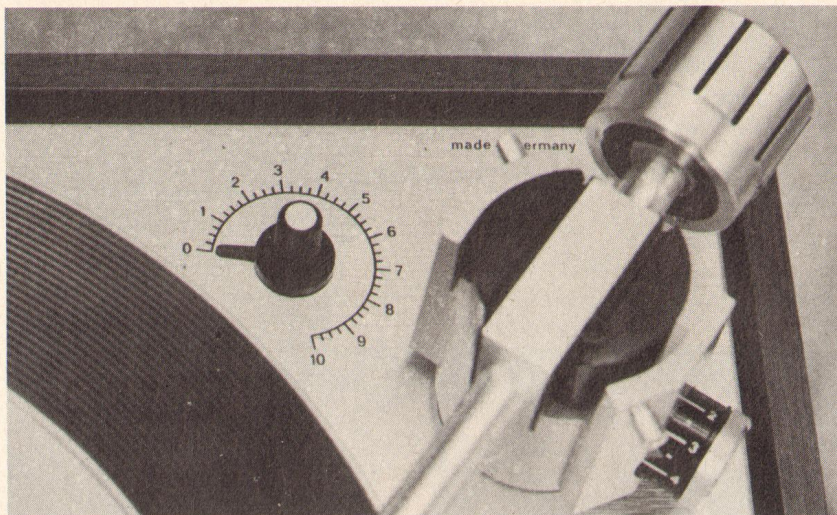


Fig 2—Showing anti-skate control.

down slightly on the tapers by means of the lever at the left front corner of the chassis.

Among the features we found most interesting are: the triple lead carrying the two shielded signal cables and the single third grounding wire; the jig for setting the stylus to the proper position for the 15-deg. vertical tracking angle, as well as for correct overhang; projections on the chassis to permit the unit to be used on the bench off its optional base without the possibility of damaging any of the mechanism; the dynamically balanced motor armature and the platter itself; the attractive appearance of the dress panel; and the overall ease of operation.

Performance

Wow and flutter measured .05% over the range from 6 to 250 Hz, with an increase to 0.11% in the ranges from 0.5 to 6.0 and 0.5 to 250 Hz. Since the motor is of the induction type, frequency variations in the supply caused no change in speed over the range from 40 to 80 Hz.

Reduction of supply voltage to 80 caused a decrease in speed of 5%; at 90 volts the unit was 1% slow, while from 100 to 135 volts there was no change in speed whatsoever. Arm resonance with the Ortofon cartridge used for the measurements was 9 Hz. Tracking was consistent down to $\frac{1}{2}$ gram as far as tripping was concerned, although it is not likely that most cartridges would perform well at that value. Signal-to-noise measured 42 dB by the NAB method, which is from 10 to 20 dB less than the ARLI figure often employed. Cycling time was measured at 10 seconds at 33 $\frac{1}{3}$ rpm.

We have used the PE-2020 regularly for the past two years and found it completely satisfactory, even if a little slow in cycling. With the PE-2040, any question we may have had about the 2020 has been answered. The unit is very attractive, and an effective performer. Even the shipping carton, with its separation of components for their protection, is a good indication of the quality of manufacture.

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